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ADHESIVE COMPOSITION AND INFORMATION RECORDING MEDIUM OBTAINED USING THE SAME

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[Claims] /2*

[Claim 1] An adhesive composition containing a cross-linked structure that is prepared by cross-linking a copolymer having the following (A) through (D) as the raw materials, the structural unit derived from the aforesaid (A) being set to from 20 to 50 % by weight of the copolymer as a whole; the structural unit derived from the aforesaid (B) to from 50 to 80 % by weight of the copolymer as a whole; the structural unit derived from the aforesaid (C) to from 1 to 20 % by weight of the copolymer as a whole; and the structural unit derived from the aforesaid (D) to from 1 to 10 % by weight of the copolymer as a whole [with the proviso that the total of the aforesaid (A) through (D) is 100 % by weight], and the solvent-insoluble content in the aforesaid cross-linked structure being from 80 to 99 % by weight:

(A) at least one of either an acrylic acid ester monomer having a C_{6-10} alkyl group or a methacrylic acid ester monomer having a C_{6-10} alkyl group;

(B) ethyl acrylate;

(C) a monomer represented by the following general formula (1):

[Chem. 1]

$$\mathrm{CH_2{=}\underset{\displaystyle R}{\underset{|}{C}}{-}COO{-}R} \quad \cdots (1)$$

[in the formula (1), R's represent hydrogen atoms or methyl groups, and they may be optionally the same or different], and

* Claim and paragraph numbers correspond to those in the foreign text.

(D) at least one of either an acrylic acid ester monomer having a hydroxyl group or a methacrylic acid ester monomer having a hydroxyl group.

[Claim 2] An information recording medium in which a first recording layer and a second recording layer are bonded by means of an adhesive layer composed of the aforesaid adhesive composition stated in Claim 1, said information recording medium having the following characteristic (X):

(X) the radial tilt change value measured by holding the medium horizontally for 100 hours in a moist heat environment at 80 °C and 85 % RH is 0.5 degrees or less.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention] The present invention pertains to an adhesive composition and an information recording medium obtained using the same.

[0002]

[Related Art] Among information recording media that are capable of recording information and reading recorded information magneto-optically or by means of optical phase change, optical recording media, in particular, are capable of recording information and reading the recorded information by irradiation of laser beams. As an example of such an optical recording medium, there is, for example, a disk-shaped optical recording medium (optical disk) (11), which is illustrated in

the cross-sectional drawing in Fig. 2. This optical disk (11) is constructed by bonding two optical disk substrates (16a and 16b), each of which is prepared by forming an optical recording layer (13a or 13b) on one side of a transparent substrate (12a or 12b) and by further forming a transparent protective layer (14a or 14b) over this surface, by means of an adhesive layer (adhesive sheet) (15) in such a way that the transparent protective layers (14a and 14b) of the optical disk substrates (16a and 16b) face each other. In the figure, reference numeral 17 is a hole that is punched approximately at the center of the optical disk (11).

[0003] The aforesaid disk (11) is prepared, for example, by the following method. After the transparent substrates (12a and 12b) are prepared by injection molding or the like, optical recording layers (13a and 13b) are formed on the surfaces thereof by sputtering or the like, and on these surfaces are further formed transparent protective layers (14a and 14b) by spin coating or the like, thereby preparing two optical disk substrates (16a and 16b). Next, the surfaces of the aforesaid optical disk substrates (16a and 16b) are coated with an adhesive by spin coating, screen printing, or the like, thereby forming an adhesive layer (adhesive sheet) (15), and, by means of this adhesive layer (adhesive sheet) (15), the aforesaid optical disk substrates (16a and 16b) are bonded together, thereby preparing the optical disk (11). As the aforesaid adhesive, reactive adhesives, such

as light-curing adhesives or thermosetting adhesives; hot-melt adhesives; and so forth have been used heretofore.

[0004]

[Problems that the Invention Intends to Solve] However, in injection-molding the aforesaid transparent substrates (12a and 12b), warping occurs in the transparent substrates (12a, 12b), or warping, deformation, or the like occurs in forming the aforesaid optical recording layers (13a and 13b) and transparent protective layers (14a and 14b); consequently, warping, deformation, or the like similarly occurs in the optical disk substrates (16a, 16b) constructed from these components. As a result, the adhesive layer (adhesive sheet) (15) of the optical disk (11) formed by bonding these optical disk substrates (16a and 16b) does not have a uniform thickness, and warping, deformation, or the like occurs in the optical disk (11) proper, thereby causing the recording medium to have problems in recording or reading (reproducing) information. Even if the optical disk (11) is formed by bonding the aforesaid optical disk substrates (16a and 16b) by means of heat or compression, the thickness of the adhesive layer becomes uneven over time in a moist heat environment, and the problem of warping, deformation, or the like occurs in the optical disk (11) proper. Thus, optical disks that exhibit little warping, deformation, or the like even in a moist heat environment and have both moist heat resistance and durability have not been achieved

yet, and the development of such optical disks has been eagerly awaited.

[0005] The present invention was achieved in view of this situation, and its objective is to provide an adhesive composition that is equipped with both moist heat resistance and durability, exhibiting an excellent bonding strength in a moist heat environment and yielding an adhesive layer having a uniform thickness, thus causing little warping, deformation, or the like, and also to provide an information recording medium obtained using this adhesive composition.

[0006]

[Means for Solving the Problems] In order to achieve the aforesaid objectives, one aspect of the present invention is an adhesive composition containing a cross-linked structure that is prepared by cross-linking a copolymer having the following (A) through (D) as the raw materials, the structural unit derived from the aforesaid (A) being set to from 20 to 50 % by weight of the copolymer as a whole; the structural unit derived from the aforesaid (B) to from 50 to 80 % by weight of the copolymer as a whole; the structural unit derived from the aforesaid (C) to from 1 to 20 % by weight of the copolymer as a whole; and the structural unit derived from the aforesaid (D) to from 1 to 10 % by weight of the copolymer as a whole [with the proviso that the total of the aforesaid (A) through (D) is

100 % by weight], and the solvent-insoluble content in the aforesaid cross-linked structure being from 80 to 99 % by weight:

[0007] (A) at least one of either an acrylic acid ester monomer having a C_{6-10} alkyl group or a methacrylic acid ester monomer having a C_{6-10} alkyl group;

(B) ethyl acrylate;

(C) a monomer represented by the following general formula (1):

[Chem. 2]

$$\underset{\displaystyle R}{CH_2=\underset{|}{C}-COO-R} \quad \cdots (1)$$

[in the formula (1), R's represent hydrogen atoms or methyl groups, and they may be optionally the same or different], and

(D) at least one of either an acrylic acid ester monomer having a hydroxyl group or a methacrylic acid ester monomer having a hydroxyl group.

[0008] A second aspect of the present invention is an information recording medium in which a first recording layer and a second recording layer are bonded by means of an adhesive layer composed of the aforesaid adhesive composition, said information recording medium having the following characteristic (X):

(X) the radial tilt change value measured by holding the medium horizontally for 100 hours in a moist heat environment at 80 °C and 85 % RH is 0.5 degrees or less.

[0009] That is, the present inventors conducted extensive research so as to obtain an information recording medium that had both

moist heat resistance and durability, exhibiting little warping, deformation, or the like over time in a moist heat environment. In the process of this research, they focused on adhesive-layer forming materials for information recording media, and their research evolved around these materials. As a result, they learned that, when a special adhesive composition that contains a special cross-linked structure formed by cross-linking a copolymer obtained by copolymerizing specific raw materials (A) through (D) and that has the solvent-insoluble content in the aforesaid cross-linked structure set to a specific range is used as the adhesive layer of an information recording medium, it becomes possible to obtain an information recording medium that has both moist heat resistance and durability, exhibiting an excellent bonding strength over time in a moist heat environment and whose adhesive layer has a uniform thickness, thus having little warping, deformation, or the like. Based on this finding, the present invention was achieved.

[0010]

[Mode of Implementing the Invention] The following will explain the mode of implementing the present invention in detail.

[0011] The special adhesive composition of the present invention contains a special cross-linked structure formed by cross-linking a copolymer that has the aforesaid A through D as the raw materials.

[0012] As the aforesaid raw material (A), at least one of either an acrylic acid ester monomer having a C_{6-10} alkyl group or a

methacrylic acid ester monomer having a C_{6-10} alkyl group is used. As the aforesaid raw material (A), those represented by the following general formula (2), for example, are used.

[0013]

[Chem. 3]

$$CH_2=\underset{\displaystyle R^1}{\underset{|}{C}}-COO-R^2 \quad \cdots (2)$$

[in the formula (2), R^1 represents a hydrogen atom or methyl group, and R^2 represents an alkyl group having from 6 to 10 carbon atoms.

[0014] Concrete examples of the aforesaid raw material (A) include hexyl acrylate, hexyl methacrylate, 2-ethylhexyl acrylate (2-EHA), 2-ethylhexyl methacrylate (2-EHMA), heptyl acrylate, heptyl methacrylate, n-octyl acrylate, n-octyl methacrylate, isooctyl acrylate, isooctyl methacrylate, isononyl acrylate, isononyl methacrylate, and so forth. These may be used singly or in combination of two or more kinds.

[0015] The aforesaid raw material (A) must be polymerized at a proportion of from 20 to 50 % by weight (hereinafter abbreviated as "%"), preferably from 25 to 40 %, of the copolymer as a whole. If the quantity of the aforesaid raw material (A) is less than 20 %, the resulting adhesive has a small cohesive power, causing the moist heat resistance of optical disks or the like to deteriorate, while a quantity exceeding 50 % leads to an insufficient bonding strength.

[0016] As the raw material (B) that is used concomitantly with the aforesaid raw material (A), ethyl acrylate (EA) is used.

[0017] The aforesaid raw material (B) must be polymerized at a proportion of from 50 to 80 %, preferably from 60 to 75 %, of the copolymer as a whole. If the quantity of the aforesaid raw material (B) is less than 50 %, a satisfactory bonding strength cannot be obtained, while a quantity exceeding 80 % causes the cohesive force to become small, thereby deteriorating the moisture heat resistance of optical disks or the like.

[0018] As the raw material (C) used concomitantly with the aforesaid raw materials (A) and (B), a monomer represented by the following formula (1) is used.

[0019]

[Chem. 4]

$$CH_2=\underset{\displaystyle R}{\underset{|}{C}}-COO-R \quad \cdots (1)$$

[in the formula (1), R’s represent hydrogen atoms or methyl groups, and they may be optionally the same or different.]

[0020] Concrete examples of the aforesaid raw material (C) include methyl acrylate, methyl methacrylate (MMA), acrylic acid, and methacrylic acid. These may be used singly or in combination of two or more kinds.

[0021] The aforesaid raw material (C) must be polymerized at a proportion of from 1 to 20 %, preferably from 2 to 10 %, of the copolymer as a whole. If the quantity of the aforesaid raw material

(C) is out of the range of from 1 to 20 %, a sufficient bonding strength cannot be obtained.

[0022] As the raw material (D) that is used concomitantly with the aforesaid raw materials (A) through (C), at least one of either an acrylic acid ester monomer having a hydroxyl group or a methacrylic acid ester monomer having a hydroxyl group is used. Concrete examples of the aforesaid raw material (D) are not specifically limited and include hydroxyethyl acrylate (HEA), hydroxyethyl methacrylate (HEMA), and so forth. These may be used singly or in combination of two or more kinds.

[0023] The aforesaid raw material (D) must be polymerized at a proportion of from 1 to 10 %, preferably from 2 to 8 %, of the copolymer as a whole. If the quantity of the aforesaid raw material (D) is out of the range of from 1 to 10 %, a sufficient bonding strength cannot be obtained.

[0024] The aforesaid raw materials (A) through (D) may be polymerized by any of the following modes of polymerization: block, random, alternate, and graft polymerization.

[0025] The preparation method of the copolymer of the present invention is not specifically limited, and the present invention may employ any selected from solution polymerization, emulsion polymerization, and suspension polymerization, of which solution polymerization is preferable.

[0026] In the case of polymerizing the monomers by the aforesaid solution polymerization or emulsion polymerization, the present invention uses, as the polymerization-use solvent (medium), water or an organic solvent--for example, benzene, toluene, xylene, hexane, cyclohexane, heptane, octane, chloromethane, chloroethane, chlorofluoromethane, chlorofluoroethane, fluoromethane, fluoroethane, methanol, ethanol, isopropyl alcohol, butyl alcohol, ethylene glycol, glycerin, ethyl acetate, acetone, methyl ethyl ketone, methyl isobutyl ketone, dioxane, dimethyl formamide, dimethyl sulfoxide, and the like--and these solvents may be used in combination as appropriate.

[0027] Further, in the production of the copolymer by the aforesaid polymerization methods, a polymerization initiator is usually used. Examples of the aforesaid polymerization initiator include, for example, radical donors, such as benzoyl peroxide (benzoyl peroxide), tert-butyl peroxide, lauroyl peroxide, cumyl peroxide, tert-butyl hydroperoxide, cumene hydroperoxide, azobisisobutyronitrile, 2,2'-azobis-(2,4-dimethylvaleronitrile), hydrogen peroxide, ammonium persulfate, sodium persulfate, potassium persulfate, 2,2'-azobis-(2-amidinopropane)-hydrochloride, redox initiators (hydrogen peroxide-ferrous chloride, ammonium persulfate-sodium hydrogen sulfite, and so forth), tert-butyl (E)-3-isopropoxycarbonyl peroxy acrylate, 1,1-di-tert-butyl peroxy-2-methylcyclohexane, 2,2-bis(4,4-di-tert-butyl peroxy cyclohexyl) propane, and the like. It is also possible to generate radicals by

photo-induced polymerizations with ultraviolet radiation, electron radiation, nuclear radiation, or the like, and, in this case, photosensitizers or the like may be used concomitantly.

[0028] Incidentally, the aforesaid copolymer is constituted from the structural units derived from the aforesaid (A) through (D), which serve as the raw materials, and the proportions of the structural units correspond to the proportions of the aforesaid raw materials (A) through (D) in the polymerization.

[0029] The aforesaid special cross-linked structure is obtained by cross-linking the aforesaid copolymer by an appropriate means. The aforesaid cross-linking means is not specifically limited, and a common method is to use a cross-linking agent, such as a polyisocyanate compound, epoxy compound, aziridine compound, metal chelate compound, metal alkoxide, or the like and to react this cross-linking agent and the aforesaid copolymer (the hydroxyl groups or carboxyl groups contained therein).

[0030] In the case of using a polyisocyanate compound as the aforesaid cross-linking agent, the proportion of the polyisocyanate compound is usually from 0.1 to 5 parts per 100 parts of the aforesaid copolymer. If the proportion of the polyisocyanate compound exceeds 5 parts, it becomes difficult to obtain a sufficient bonding strength.

[0031] The solvent-insoluble content in the aforesaid special cross-linked structure must be from 80 to 99 %, preferably from 85 to 98 %. If the solvent-insoluble content in the cross-linked structure

is less than 80 %, the radial tilt change value becomes too large, and moisture heat resistance becomes poor. If it exceeds 99 %, it becomes difficult to obtain a sufficient bonding strength.

[0032] The solvent-insoluble content in the aforesaid cross-linked structure can be found as follows. Approximately 0.1 g of a sample is cut from the cross-linked structure, and this piece is immersed in toluene at room temperature for 5 days. Next, the sample is pulled out and transferred to an aluminum cup with tweezers, and it is dried at 130 °C for 2 hours, after which the sample is weighed. Then, the solvent-insoluble content is found according to the following equation:

[0033]

[Equation 1]

Solvent-insoluble content (% by weight) = [sample weight (g) after immersion and drying] / [sample weight] x 100

[0034] It is desirable for the aforesaid cross-linked structure to make up a minimum of 2 % of the adhesive composition as a whole.

[0035] It is possible for the special adhesive composition of the present invention to incorporate heretofore-known tackifiers, additives, antioxidants, and the like as appropriate in addition to the aforesaid cross-linked structure.

[0036] The special adhesive composition of the present invention is used as, for example, the material for forming the adhesive layer (5) of the optical recording medium (optical disk) (1) shown in Fig. 1

(a) and (b). The aforesaid optical recording medium (optical disk) (1) has a discoid shape, as shown in Fig. 1 (a) and (b), and two optical disk substrates (6a and 6b), each of which is prepared by forming an optical recording layer (3a or 3b) on one side of a transparent substrate (2a or 2b) and further forming a transparent protective layer (4a or 4b) over this surface, are bonded by means of an adhesive layer (adhesive sheet) (5) in such a way that the transparent protective layers (4a and 4b) of the optical disk substrates (6a and 6b) face each other, thereby constructing the optical recording medium. Then, a hole (7) is punched approximately at the center of the aforesaid optical recording medium (1).

[0037] The aforesaid optical recording medium (optical disk) (1) can be produced, for example, as follows. First, on one side of each transparent substrate (2a or 2b), an optical recording layer (3a or 3b) is formed by sputtering or the like, and on this surface is further formed a transparent protective layer (4a or 4b) by spin coating or the like, thereby preparing two optical disk substrates (6a and 6b). Meanwhile, the copolymer obtained by copolymerizing the aforesaid specific raw materials (A) through (D) is cross-linked by the aforesaid method, thereby preparing an adhesive composition that has, as the main component, a special cross-linked structure in which the solvent-insoluble content is set to a specific value. Next, the aforesaid adhesive composition is applied to a release liner comprised

of polyethylene terephthalate (PET) film or the like and dried, thereby preparing an adhesive sheet (5).

[0038] Then, the aforesaid two optical disk substrates (6a and 6b), which are so positioned that the transparent protective layers (4a and 4b) face each other, are pressed against each other and bonded through the aforesaid adhesive sheet (5) to form them in one piece, thereby preparing the intended optical recording medium (optical disk) (1). It is important to perform the bonding of the aforesaid optical disk substrates (6a and 6b) and the adhesive sheet (5) without encapsulating air bubbles, and the present invention can usually employ bonding with the use of a hand roller, rubber roller, press, or the like; bonding under a reduced pressure; bonding with pressure application; or the like.

[0039] Because, in the optical recording medium (optical disk) (1) of the present invention obtained in this manner, a special adhesive composition is used as the material for forming the adhesive layer (adhesive sheet) (5), the radial tilt change value of the recording medium is 0.5 degrees or less, as measured by holding it horizontally for 100 hours in a moist heat environment at 80 °C x 85 %RH; thus, the medium has both excellent moist heat resistance and durability.

[0040] The aforesaid radial tilt change value is the angle of warping in the central axis direction (radial direction) that occurs when the aforesaid optical disk (1) is held horizontally, and it is a

value that is found by rotating the optical disk (1) at a rotation speed of 100 rpm, by applying a laser beam to it, and by measuring the deflection of the optical disk (1) from the reflected light.

[0041] The materials for forming the transparent substrates (2a and 2b), optical recording layers (3a and 3b), and transparent protective layers (4a and 4b) that constitute the aforesaid optical recording medium (optical disk) (1) are not specifically limited, and heretofore-known materials can be used as appropriate. For instance, as the aforesaid transparent substrates (2a and 2b), it is desirable to use polycarbonate transparent substrates or the like, and, as the material for the aforesaid transparent protective layers (4a and 4b), the use of acrylic-based ultraviolet curable resin or the like is desirable.

[0042] The following will explain working examples, together with comparative examples.

[0043]

[Working Examples 1 through 4 and Comparative Examples 1 through 5] First, on one side of each polycarbonate transparent substrate, an optical recording layer was formed by sputtering, on which was further formed a transparent protective layer composed of an acrylic-based ultraviolet curable resin by spin coating, thereby preparing two optical disk substrates having a discoid shape.

[0044] Meanwhile, an adhesive sheet was prepared as follows. The raw materials A through D shown in Tables 1 and 2 below were mixed at

the proportions shown in the same tables, thereby obtaining a monomer mixture. Next, based on the total quantity of this monomer mixture, 100 parts toluene, which is a polymerization-use solvent, and 0.2 parts benzoyl peroxide, which is a polymerization initiator, were added, and the mixture was solution-polymerized at 60 °C for approximately 7 hours in a nitrogen ambience, thereby obtaining a copolymer solution. Next, to 100 parts of this copolymer solution was added 0.2 parts of a catalyst (OL-1, a product of Tokyo Fine Chemical Co.) and subsequently added 3 parts of a tolylene diisocyanate adduct of trimethylolpropane (Coronate L, a product of Nippon Urethane Co.), thereby obtaining a special adhesive composition. Thereafter, the aforesaid special adhesive composition was applied to a release liner (PET film) and dried at 130 °C for 5 minutes, thereby forming a 50 µm-thick adhesive sheet. Then, this adhesive sheet was punched in a discoid shape that was slightly smaller than the aforesaid optical disk substrates having a discoid shape, thereby obtaining an adhesive sheet.

[0045] Then, by means of the aforesaid adhesive sheet, the aforesaid two optical disk substrates were bonded according to the method described before, thereby preparing the intended optical disk.

[0046] Using each adhesive sheet obtained in this manner, the solvent-insoluble content in the cross-linked structure and bonding strength were determined according to the following criteria. The results are also shown in Tables 1 and 2 below.

[0047] [Solution-insoluble content in the cross-linked structure] Approximately 0.1 g of a sample (cross-linked structure) was cut from the aforesaid adhesive sheet, and this piece was immersed in toluene at room temperature for 5 days. Next, the sample was pulled out and transferred to an aluminum cup with tweezers, and it was dried at 130 °C for 2 hours, after which the sample was weighed. Then, according to the equation presented earlier, the solvent-insoluble content in the cross-linked structure was determined.

[0048] [Bonding strength] Each of the aforesaid adhesive sheets was pressure-bonded on a SUS plate by running a rubber roller (a 2 kg load) back and forth once. Then, the sample was left standing for approximately 30 minutes, after which the sample was subjected to a 180° peel test at a speed of 300 mm/minute in a 23 °C ambience, using Tensilon UMT-4-100, a product of Toyo Baldwin Co. Incidentally, the width of each test piece was 20 mm.

[0049]

[Table 1]

(I)(部)

		実施 (J) 例			
		1	2	3	4
A	2-エチルヘキシルアクリレート(2-EHA)	30	30	40	20
B	エチルアクリレート(EA)	70	70	80	78
C	メチルメタクリレート(MMA) (C-1)	5	5	5	1
	アクリル酸 (C-2)	—	1	—	—
D	ヒドロキシエチルアクリレート(HEA)	5	5	5	1
架橋剤 (コロネート L) (E)		3	3	3	3
各原料の共重合体全体 (A+B+C+D) に占める割合 (%) (F)	A	27.27	27.02	36.36	20
	B	63.63	63.06	54.55	78
	C	4.5	5.41	4.5	1
	D	4.5	4.5	4.5	1
溶剤不溶分 (重量%) (G)		97	85	87	83
接着力 (g/20mm幅) (H)		400	500	300	400

Key: A) 2-ethylhexyl acrylate (2-EHA); B) ethyl acrylate (EA); C-1) methyl methacrylate (MMA); C-2) acrylic acid; D) hydroxyethyl acrylate (HEA); E) cross-linking agent (Coronate L); F) proportion (%) of each raw material based on the copolymer as a whole (A+B+C+D); G) solvent-insoluble content (% by weight); H) bonding strength (g/20 mm width); I) parts; J) working examples

[0050]

[Table 2]

(I)(部)

		比較例(J) 1	2	3	4	5
A	2-エチルヘキシルアクリレート(2-EHA)	30	30	55	15	20
B	エチルアクリレート(EA)	70	70	45	85	80
C	メチルメタクリレート(MMA)(C-1)	15	5	5	5	―
C	アクリル酸(C-2)	―	15	―	―	―
D	ヒドロキシエチルアクリレート(HEA)	15	5	5	5	―
架橋剤(コロネートL)(E)		3	3	3	3	3
各原料の共重合体全体(A+B+C+D)に占める割合(%)(F)	A	23.08	24	50	13.63	20
	B	53.85	56	40.91	77.27	80
	C	11.54	16	4.5	4.5	―
	D	11.54	4	4.5	4.5	―
溶剤不溶分(重量%)(G)		96	75	98	82	89
接着力(g/20mm幅)(H)		50	760	200	500	300

Key: A) 2-ethylhexyl acrylate (2-EHA); B) ethyl acrylate (EA); C-1) methyl methacrylate (MMA); C-2) acrylic acid; D) hydroxyethyl acrylate (HEA); E) cross-linking agent (Coronate L); F) proportion (%) of each raw material based on the copolymer as a whole (A+B+C+D); G) solvent-insoluble content (% by weight); H) bonding strength (g/20 mm width); I) parts; J) comparative examples

[0051] In addition, using the optical disks prepared in the working examples and comparative examples, their radial tilt change values were measured according to the standard described below, and their appearances were also compared and evaluated. The results are also shown in Tables 3 and 4 below.

[0052] [Radial tilt change value] An optical disk was held in a horizontal condition for 100 hours in a moist heat environment at 80 °C x 85 %RH. Then, the optical disk was rotated at a speed of 100 rpm and exposed to a laser beam, and the radial tilt change value was

determined from the deflection of the optical disk found from the reflected light.

[0053] [Appearance] The disks that did not have any peeling, separation, or the like at the interface of the adhesive sheet and optical disk substrates were indicated with O, and those that had peeling, separation, or the like with X.

[0054]

[Table 3]

	Working Examples			
	1	2	3	4
Radial tilt change value (°)	0.20	0.30	0.25	0.30
Appearance	O	O	O	O

[0055]

[Table 4]

	Comparative Examples				
	1	2	3	4	5
Radial tilt change value (°)	---*	0.60	---*	0.60	0.60
Appearance	X	O	X	O	O

* It could not be measured.

[0056] From the results shown in the aforesaid Tables 3 and 4, it can be seen that the optical disks of the working examples had excellent bonding strength and also had small radial tilt change values, thus indicating that they had excellent moisture heat resistance and durability, because their adhesive layers were formed from special adhesive compositions in which the quantities of raw materials A through D were set to specified ranges and the solvent-insoluble content to a specified range.

[0057] In contrast, the optical disks of Comparative Examples 1 and 3 had a low bonding strength because the quantities of raw materials A through D were out of the specified ranges, and peeling, separation, or the like was observed at the interface of the adhesive sheet and optical disk substrates. Further, with respect to the optical disks of Comparative Examples 2 and 4, the quantity of each monomer was out of the specified range or the solvent-insoluble content was out of the specified range; as a result, their radial-tilt change values were large, thus indicating that their moist heat resistance and durability were inferior.

[0058]

[Effects of the Invention] As shown in the foregoing, because the information recording medium of the present invention has an adhesive layer that is formed from a special adhesive composition that contains a special cross-linked structure prepared by cross-linking a copolymer obtained by copolymerizing special raw materials A through D in specified proportions and also that has the solvent-insoluble content in the aforesaid cross-linked structure set to a specified range, the recording medium is equipped with both moist heat resistance and durability, exhibiting an excellent bonding strength over time in a moist heat environment and also having an adhesive layer having a uniform thickness, which leads to little warping, deformation, or the like.

[0059] In addition, because the special adhesive composition of the present invention has excellent coatability and workability, operation efficiency in preparing information recording media improves.

[Brief Explanation of the Drawings]

[Fig. 1] (a) is a cross-sectional drawing illustrating the structure of one example of the optical recording medium (optical disk) of the present invention, and (b) its plan view.

[Fig. 2] A cross-sectional drawing that illustrates the structure of a conventional optical recording medium (optical disk).

[Explanation of the Reference Numerals]

1 Optical recording medium (optical disk)

2a, 2b Transparent substrate

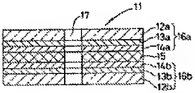
3a, 3b Optical recording layer

4a, 4b Transparent protective layer

5 Adhesive layer (adhesive sheet)

6a, 6b Optical disk substrate

[FIG. 2]



[FIG. 1]